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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/547,194	11/02/2005	Atef Abou-Akar	125129	9181
25944 7590 06/27/2007 OLIFF & BERRIDGE, PLC P.O. BOX 19928 ALEXANDRIA, VA 22320			EXAMINER NGUYEN, TRAN N	
			ART UNIT 2834	PAPER NUMBER
			MAIL DATE 06/27/2007	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/547,194

Applicant(s)

ABOU-AKAR ET AL.

Examiner

Tran N. Nguyen

Art Unit

2834

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 May 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-30 is/are pending in the application.
- 4a) Of the above claim(s) 24-30 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10, 13-15 and 17-23 is/are rejected.
- 7) ☒ Claim(s) 11, 12 and 16 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 August 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Restriction Election

Restriction has been required under 35 U.S.C. 121 and 372.

- I. **Claims 1-23, and 31** drawn to structure of a synchronous electric machine, classified in class 310, subclass 156.38.
- II. **Claims 24-30**, drawn to motor control device/circuit, classified in class 318, subclass 254.

The applicant selected claims 1-23 and 31, filed on 5/17/07, with traverse. The applicant's reason for traverse is that the subject matter of all claims 1-31 is sufficiently related that a thorough search for the subject matter of claims would encompass a search for the subject matter of the remaining claims. Thus, it is respectfully submitted that the search and examination of the entire application could be made without serious burden. See MPEP §803.

In response to the applicant's statement that "search for the subject matter of claims would encompass a search for the subject matter of the remaining claims", as set forth in the restriction requirement, there are two separate groups of claims that are drawn to two distinguish classes of different searches. Claims 1-23 and 31 are related to respectively structure of a synchronous electric machine classified in class 310, subclass 156.38 while claims 24-30 related to drawn to motor control device/circuit, classified in class 318, subclass 254. Searching for the structure of the claimed synchronous electric machine would not encompass a search for the control circuit and/or method of control a synchronous electric machine. Particularly in this case the control device claim dependent claim 24 depends from claim 1 that is written so broad that any control device and/or control method of any synchronous machine that has the direct reactance being greater than quadrature reactance would have been applicable.

Thus, the applicant's traverse reason is not persuasive. The restriction is hereby maintained and made FINAL.

Claim Rejections - 35 USC § 112

Claims 4-5 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 4-5 are indefinite because the parameter "E" in the math expression of **claims 4-5** is not defined.

Claim Rejections - 35 USC § 102/103

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

1. **Claims 1-5, 8-9, 17-18, 20, 23 and 31** are rejected under 35 U.S.C. **102(b)** as being fully anticipated by **Bianchi et al (IEEE Vol. 36, no. 4 dated July-August 2000, submitted as IDS by the Applicant)** in the alternative, under 35 U.S.C. 103(a) as obvious over **Bianchi**.

Bianchi discloses a synchronous electrical machine (figs 9b-10b) comprising: a stator (figs 9b-10b); and at least one rotor (figs 9b-10b) having permanent magnets, wherein, as disclosed illustrated by the graphs thereof, the machine is designed so as to have $X_d > X_q$, where X_d is the direct reactance and X_q is the quadrature reactance; and the ratio of $X_d/X_q > 1.1$ or $X_d/X_q > 1.5$ and the ratio X_d/X_q is ≈ 3 , or wherein: $X_q I_o/E$ is between 0.33 and 0.6, or between 0.66 and 1; and wherein the rotor is a flux-concentrating rotor, the permanent magnets (unnumbered) of the rotor being placed between pole pieces, each has a convex face turned toward the stator (figs 10a-10b).

Regarding claims 2-5, 20 and 31, as disclosed and illustrated by the graphs, **Bianchi** discusses the range of the ratio of X_d/X_q , one may disagree that Bianchi's ratio range to be equal to the recited range of the present invention.

Nevertheless, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the Bianchi's machine to obtain a preferable optimum range so that the ratio of $X_d/X_q > 1.1$ or $X_d/X_q > 1.5$ and the ratio X_d/X_q is ≈ 3 , or wherein: $X_q I_o/E$ is between 0.33 and 0.6, or between 0.66 and 1. Doing so would further enabling the permanent-magnet synchronous motor to extend flux-weakening capabilities and enhance the overall efficiency; such modification has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.

- 2. Claims 1, 2, 8-9, 17-18, 20, 23 and 31** are rejected under 35 U.S.C. **102(b)** as being fully anticipated by **EP 1164684A**, or in alternation by **DE 19723302A**.

EP 1164684A (fig 4) or alternately **DE 19723302A (figs 1-2)**, each discloses a synchronous electrical machine comprising: a stator (not shown, but inherently); and at least one rotor having permanent magnets, wherein the machine is designed so as to have $X_d > X_q$, where X_d is the direct reactance and X_q is the quadrature reactance; and the ratio of $X_d/X_q > 1.1$ or $X_d/X_q > 1.5$; and the rotor is a flux-concentrating rotor, the permanent magnets of the rotor being placed between pole pieces, each has a convex face turned radially outward.

- 3. Claims 1, 2, 8-9, 13, 15, 17-18, 20, 23 and 31** are rejected under 35 U.S.C. **102(b)** as being fully anticipated by **DE 3016540A**.

DE 3016540A (figs 1-2), each discloses a synchronous electrical machine comprising: a stator (not shown, but inherently); and at least one rotor having permanent magnets, wherein the

machine is designed so as to have $X_d > X_q$, where X_d is the direct reactance and X_q is the quadrature reactance; and the ratio of $X_d/X_q > 1.1$ or $X_d/X_q > 1.5$; and the rotor is a flux-concentrating rotor, the permanent magnets (4-5) of the rotor being placed between pole pieces (2), each has a convex face turned radially outward (toward where the stator would be), wherein the each of the permanent magnets of the rotor lies radially set back from the circumferential ends of the convex portions of the two adjacent pole pieces (fig 1).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. **Claims 6-7, 10, 14, 19 and 22** are rejected under 35 U.S.C. 103(a) as being unpatentable over one of the prior-art: **Bianchi, EP 1164684A, DE 19723302A, and DE 3016540A**, as applied in the base claim, and in view of **Nitta et al (US 6,265,804)**.

Regarding claims 6-7, each of the listed prior-art that is applied in the rejection against the base claim, except for the added limitations of the stator has teeth, each carrying at least one individual coil, wherein the teeth of the stator are devoid of pole shoes.

Nitta, however, teaches a stator (fig 6) has teeth, each carrying at least one individual coil, wherein the teeth of the stator are devoid of pole shoes for the purpose of facilitating coil winding as well as reducing iron loss.

Thus, it would have been obvious to one skilled in the art at the time the invention was made to modify the machine by modifying the stator with features, as taught by Nitta. Doing so would reduce iron loss as well as make coil winding easy.

Regarding claims 10, 14 and 19, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the Bianchi's machine to obtain the preferable optimum ranges of the following:

the convex portion of a pole piece has a radius of curvature of between 20% and 30% of the inside radius of the stator, or

the setback (r) in the radial direction of the magnets relative to the circumferential ends of the convex portions lies between 10% and 20% of the inside radius of the stator, or

Configure the stator having $6n$ teeth and the rotor has $6n \pm 2$ poles, n being greater than or equal to 2.

Doing so would further enabling the permanent-magnet synchronous machine to enhance the overall efficiency; such modification has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.

Regarding claim 22, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the machine so that it would be constitute as a generator. Doing so would enable to use the machine as a generator in order to converting mechanical input into electrical output for generating electric.

Allowable Subject Matter

5. Claims 11-12 and 16 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Communication

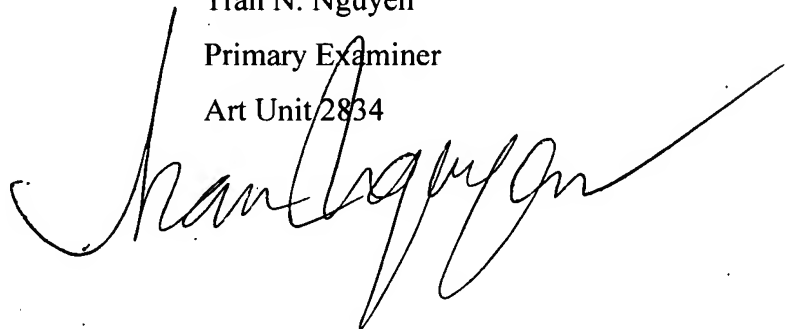
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tran N. Nguyen whose telephone number is 571-272-2030. The examiner can normally be reached on 7:00 AM - 4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Darren Schuberg can be reached on 571-272-2044. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300. (**Note: Use this Central Fax number 571-273-8300 for all official response.**)

Do **not** use the Examiner's RightFax number without informing the Examiner first because, according to the USPTO policy, any document being sent via RightFax is treated as unofficial response and will not be officially dated until it is routed to the Central Fax.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Tran N. Nguyen
Primary Examiner
Art Unit 2834

A handwritten signature in black ink, appearing to read 'Tran N. Nguyen', is written over the typed name and title. The signature is fluid and cursive, with a long horizontal stroke extending to the right.